CHAPTER - V

CONCLUSION
CONCLUSION

5.1 SUMMARY:

Fixed / mobile communication system is designed with the objective of providing communications to subscribers, which occupy arbitrary locations in the service area. This requirement to serve large number of subscribers distributed over a vast area has spurred the need to find out optimum solution to optimum system design for wide area coverage employing wireless infrastructure, that utilises minimum spectrum bandwidth and indicates erlangs/radio channels per square kms throughput of the system.

One of the typical problems with a conventional point to point or point to multipoint radio system is its limited service capability and inefficient spectrum utilisation. This is because of fact that such systems are usually deployed to start with for immediate communication necessities and later on the systems are spread out for long term communication needs by constructing more infrastructure and installing more radio systems. Of course, a communication system (terrestrial) should serve wide area, non frequency interference, minimum frequency slots for having sufficient channels of communications for the subscribers at radio terminals located in service area.

The requirement, therefore, exists to find some kind of area coverage technique using a number of base stations for use of radio frequency slots in order to optimally utilise the frequency spectrum. The choice of wireless infrastructure has strong correlation with service radio of every cell around
CONCLUSION

the base station. The number of base stations again has a bearing with long

term infrastructure cost.

For a given wireless infrastructure i.e. tower height at the base station and
remote terminal station, system parameters predominantly the receiver
threshold for 99.97% availability(say) and signal loss calculations
determine the service radii as well as minimum separation required
between base stations using the same radio frequency or adjacent radio
frequency. A system designed with above consideration meets the objective
of wide area services i.e. full coverage and in case the frequency slots are
jam packed incorporating adjacent channel and co-channel interference
insulation, the minimum bandwidth utilisation is ensured.

Relationship between bandwidth units(number of frequency slots required
in total for wide area coverage) and its product with reciprocal of cell
service area with the service radii has been established using computer
tools for typical radio system parameters and tower heights at base stations
and terminal stations. The algorithm used for obtaining above results give a
fair idea of erlangs per square kilometre traffic bearing capacity(assuming
one erlang for every radio channel) with respect to the service radii for
tower heights \( h_1 \) and \( h_2 \) at Tx-Rx locations. The service radii parameter is
related to the number of base stations towers and its inversely related to
total optimum traffic bearing capacity of the system designed. The
methodology and the algorithm utilised for establishing the above
CONCLUSION

relationship is unique and has been developed using important system parameters like transmission power, receiver threshold for low bit error rate, antenna gains and fade margin-hop distance relationship based upon atmospheric and terrain parameters. Effect of air protocols in the radio system are reflected in bit error rate versus received level nomograms for specified modulation techniques. Threshold figures used in the algorithms take into account most of the technology parameters and can influence strongly the evaluation process explained above for commercial applications of the algorithm. Path loss calculations with losses predicted because of knife edge obstacles and smooth earth obstacles in the Fresnel zones also have strong influence on the evaluation when the radio terminal antenna heights are reduced to nominal values. This prediction has to be done very carefully in case the results of the algorithm are to be used commercially.
CONCLUSION

5.2 FUTURE WORK:

The algorithm design indicates a fundamental approach to systematise the wireless infrastructure design for optimum bandwidth utilisation for a given erlangs per square kilometer for technologies in hand. The algorithm has the potential for exploiting the same to evaluate the technology for a given wireless infrastructure and to suggest improvements for better spectrum utilisation without effecting changes in the existing wireless infrastructures. The design approach can be further complicated to evaluate erlangs per square kilometre traffic bearing capacity of a given technology commissioned on existing wireless infrastructure. Suggestions can also be worked out for rehabilitation of existing infrastructures by designing more base stations or their rearrangement to optimise the spectrum and spare out some of the frequency bands without affecting the traffic bearing capacity. In other words more overlay wireless services with each having its own erlangs per square kilometer requirements can be worked out with the algorithm on existing wireless infrastructure and knowing how much spectrum bandwidth is to be set aside for the application.